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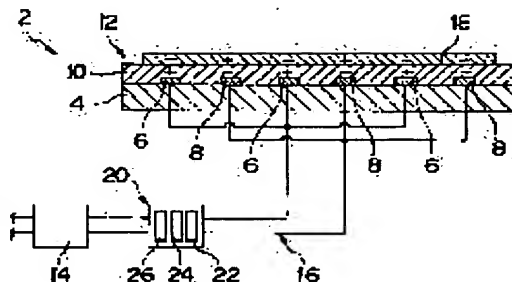
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(54) STATIC ELECTRICITY HOLDING DEVICE

(57)Abstract:

PURPOSE: To stably hold an object to be attracted for a long time by means of newly generated attraction force by providing a switching means to switch DC power supply so as to make 'on' condition in which once after passing 'off' condition, reverse plus/minus electric charges are respectively given to a set of electrodes.

CONSTITUTION: The switching circuit 20 of a static electricity holding device 2 inverts the polarity of DC power supply at every prescribed time t_1 once after passing 'off' condition so as to make 'on' condition in which electric charges of reverse plus/minus polarity are given to a set of electrodes 6, 8. Hereby, when DC power is supplied to a set of electrodes 6, 8 so as to attract and hold an object 18 to be attracted for a long time, the electric charge of the object 18 attracted and held by an attraction plate 12 is cancelled so as to prevent electrification. Further, because the switching circuit 20 changes polarity of DC power supply at every prescribed time t_1 , new electrostatic attraction force is applied between the respective electrodes 6, 8 and the object 18, and the object 18 is attracted and held to an attraction layer 10 by the newly generated attraction force.



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JAPANESE

[JP,06-155214,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS OPERATION EXAMPLE DESCRIPTION OF
DRAWINGS DRAWINGS

[Translation done.]

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CLAIMS

[Claim(s)]

[Claim 1] The fixing disc which carried out the laminating of the adsorption layer which dielectricity is carried out with an insulating substratum, the electrode of the lot to which forward negative charge is given by flow, respectively, and the electrode of this lot, and adsorbs the adsorbate-ed with an electrostatic suction force one by one is prepared. In the electrostatic supporting structure which prepared the power supply section which DC power supply are supplied [power supply section] to the electrode of said lot, and makes said adsorption layer produce an electrostatic suction force DC power supply are supplied to the electrode of said lot. when making said adsorption layer produce an electrostatic suction force and change-over conditions are satisfied, once pass non-switch-on -- the electrode of said lot -- respectively -- positive/negative -- the electrostatic supporting structure characterized by establishing the means for switching which switches DC power supply that it should consider as the switch-on which gives a reverse charge.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention can prevent the fall of the suction force in the case of starting the electrostatic supporting structure, especially adsorbing the adsorbate-ed over long duration, and relates to the electrostatic supporting structure which is stabilized over long duration and can hold the adsorbate-ed.

[0002]

[Description of the Prior Art] The electrostatic supporting structure which carries out adsorption maintenance of the adsorbate-ed using the Coulomb force of static electricity prepared the fixing disc which carried out the laminating of an insulating substratum, the electrode of a lot, and the adsorption layer one by one, and has prepared the power supply section which DC power supply are supplied [power supply section] to the electrode of said lot, and makes said adsorption layer produce an electrostatic suction force. The electrostatic supporting structure supplies DC power supply to the electrode of the lot of a fixing disc by the power supply section, it gives forward negative charge to the electrode of said lot by this flow, respectively, carries out, carries out dielectricity of the fixing disc, adsorbs the adsorbate-ed with the electrostatic suction force of this fixing disc, and holds.

[0003] As such the electrostatic supporting structure, there are some which are indicated by JP,47-39392,B and JP,62-153034,A.

[0004] in case the electrostatic supporting structure of the indication to JP,47-39392,B adsorbs paper, after it considers as a reverse polarity temporarily with a rotary switch -- the polarity at the time of adsorption -- switch-on -- in case a change and paper are exfoliated like, after considering as a reverse polarity temporarily, it switches so that it may be in non-switch-on.

[0005] in case the electrostatic supporting structure of the indication to JP,62-153034,A adsorbs sheets, such as paper, after it carries out the seal of approval of the alternating voltage temporarily with a change-over switch -- the polarity at the time of adsorption -- switch-on -- in case a change and a sheet are exfoliated like, after carrying out the seal of approval of the alternating voltage temporarily, it switches so that it may be in non-switch-on.

[0006]

[Problem(s) to be Solved by the Invention] By the way, there are some which adsorb the adsorbate-ed and hold it over long duration in the conventional electrostatic supporting structure. In such a case, the electrostatic supporting structure continues and supplies DC power supply to the electrode of a lot.

[0007] However, the adsorbate-ed by which adsorption maintenance was carried out is charged in a fixing disc, and the electrostatic supporting structure has the problem on which the electrostatic suction force by the fixing disc is reduced in it, when DC power supply are supplied to the electrode of a lot that adsorption maintenance of the adsorbate-ed should be carried out over long duration.

[0008] For this reason, the conventional electrostatic supporting structure's having un-arranged [which a suction force declines and it becomes impossible to hold the adsorbate-ed, and is stabilized over long duration and cannot hold the adsorbate-ed], when the adsorbate-ed was

adsorbed over long duration.

[0009]

[Means for Solving the Problem] That it should cancel such un-arranging then, this invention The fixing disc which carried out the laminating of the adsorption layer which dielectricity is carried out with an insulating substratum, the electrode of the lot to which forward negative charge is given by flow, respectively, and the electrode of this lot, and adsorbs the adsorbate-ed with an electrostatic suction force one by one is prepared. In the electrostatic supporting structure which prepared the power supply section which DC power supply are supplied [power supply section] to the electrode of said lot, and makes said adsorption layer produce an electrostatic suction force When supplying DC power supply to the electrode of said lot, making said adsorption layer produce an electrostatic suction force and change-over conditions are satisfied, it is characterized by establishing the means for switching which switches DC power supply that it should consider as the switch-on which once gives the charge of positive/negative reverse to the electrode of said lot through non-switch-on, respectively.

[0010]

[Function] According to the configuration of this invention, a means for switching switches DC power supply that it should consider as the switch-on which once gives the charge of positive/negative reverse to the electrode of said lot through non-switch-on, respectively, when supplying DC power supply to the electrode of the lot of a fixing disc, making the adsorption layer produce an electrostatic suction force and change-over conditions are satisfied.

[0011] thereby, the electrostatic supporting structure should once pass non-switch-on -- the electrode of said lot -- respectively -- positive/negative -- when supplying DC power supply to the electrode of a lot that adsorption maintenance of the adsorbate-ed should be carried out over a long time by giving a reverse charge, the charge of the adsorbate-ed by which adsorption maintenance was carried out can be negated to a fixing disc, and electrification can be prevented. Moreover, the electrostatic supporting structure makes an electrostatic suction force newly act between each electrode and the adsorbate-ed by the change of DC power supply, can adsorb the adsorbate-ed with this newly produced suction force at an adsorption layer, and can be held.

[0012]

[Example] Based on a drawing, the example of this invention is explained below.

[0013] Drawing 1 - drawing 3 show the 1st example for this invention. In drawing 1 and drawing 2, 2 is the electrostatic supporting structure. The electrostatic supporting structure 2 has formed the fixing disc 12 which carried out the laminating of the adsorption layer 10 which dielectricity is carried out with the insulating substratum 4, the electrode 6-8 of the lot to which forward negative charge is given by flow, respectively, and the electrode 6-8 of this lot, and adsorbs the adsorbate 18-ed with an electrostatic suction force one by one, as shown in drawing 2. Moreover, the electrostatic supporting structure 2 has formed the power supply section 14 which DC power supply are supplied [power supply section] to the electrode 6-8 of said lot, and makes said adsorption layer 10 produce an electrostatic suction force. The power supply section 14 is connected to the electrode 6-8 of a lot according to the cable run 16.

[0014] If said electrostatic supporting structure 2 supplies and flows through DC power supply in the electrode 6-8 of the lot of a fixing disc 12 from a power supply section 14 and forward negative charge is given, respectively, dielectricity of the adsorption layer 10 of a fixing disc 12 will be carried out. If the electrostatic supporting structure 2 contacts the adsorbate 18-ed to an adsorption layer 10 as shown in drawing 1, the polar charge which differs from the polarity of the charge of each electrode 6-8 by electrostatic induction, respectively to each electrode 6-8 of this adsorbate 18-ed and the part which counters will produce it.

[0015] Thereby, an electrostatic suction force acts between the charge of each electrode 6-8, and the charge produced in the adsorbate 18-ed, and the electrostatic supporting structure 2 adsorbs and holds the adsorbate 18-ed on the front face of an adsorption layer 10.

[0016] In such the electrostatic supporting structure 2, the change-over circuit 20 is established in the cable run 16 between an electrode 6-8 and a power supply section 14 as a means for switching. The change-over circuit 20 switches the DC power supply which a power supply

section 14 supplies that it should consider as the switch-on which once gives the charge of positive/negative reverse to the electrode 6-8 of a lot through non-switch-on, respectively, when supplying DC power supply to the electrode 6-8 of a lot, making the adsorption layer 10 produce an electrostatic suction force and change-over conditions are satisfied.

[0017] In this 1st example, the change-over circuit 20 which consists of the timer section 22, the decision section 24, and the change-over section 26 is formed.

[0018] The timer section 22 of the change-over circuit 20 clocks the time amount t from the flow initiation by supply of the DC power supply of a power supply section 14, as shown in drawing 3. Said decision section 24 judges whether it is the no in which the change-over conditions of exceeding [the time amount t which the timer section 22 clocks]-predetermined time $t1$ ** are satisfied, and when change-over conditions are satisfied, it carries out change-over actuation of the change-over section 26.

[0019] Change-over actuation is carried out by the decision section 24, and said change-over section 26 suspends supply of the DC power supply to the electrode 6-8 of a lot, and switches a cable run 16 that it should consider as the switch-on which intercepts a cable run 16 that it should once consider as non-switch-on, reverses the polarity of DC power supply, and gives the charge of positive/negative reverse to the electrode 6-8 of a lot, respectively.

[0020] Next, an operation of the 1st example is explained.

[0021] The electrostatic supporting structure 2 supplies and flows through DC power supply in the electrode 6-8 of the lot of a fixing disc 12 from a power supply section 14, and carries out dielectricity of the adsorption layer 10 of a fixing disc 12 by giving forward negative charge, respectively. If the electrostatic supporting structure 2 contacts the adsorbate 18-ed to the adsorption layer 10 by which dielectricity was carried out, an electrostatic suction force acts between the charge of each electrode 6-8, and the charge of a different polarity produced in the adsorbate 18-ed, and it will stick to an adsorption layer 10 and will hold the adsorbate 18-ed.

[0022] The current value of the DC power supply supplied by said power supply section 14 falls to a predetermined value, after starting to a peak price immediately after flow initiation, as shown in drawing 3, and it decreases gradually after that. When the change-over circuit 20 supplies DC power supply and is making the adsorption layer 10 produce an electrostatic suction force, it clocks the time amount t from the time of flow initiation, and switches switch-on.

[0023] When the change-over circuit 20 supplies DC power supply to the electrode 6-8 of a lot, makes an adsorption layer 10 produce an electrostatic suction force and holds the adsorbate 18-ed, it clocks the time amount t from the flow initiation by supply of DC power supply by the timer section 22.

[0024] The decision section 24 carries out change-over actuation of the change-over section 26, when the change-over conditions of exceeding [the time amount t which the timer section 22 clocks]-predetermined time $t1$ ** are satisfied. The change-over section 26 switches a cable run 16 that it should consider as the switch-on which gives the charge of positive/negative reverse to the electrode 6-8 of a lot, respectively, after intercepting a cable run 16 that supply of the DC power supply to the electrode 6-8 of a lot should be suspended, and it should once consider as non-switch-on, if the time amount t which the timer section 22 clocks exceeds predetermined time $t1$.

[0025] Thereby, the electrostatic supporting structure 2 reverses and flows through the polarity of the DC power supply supplied to an electrode 6-8, and makes an electrostatic suction force newly act between the charge of each electrode 6-8, and the charge of the adsorbate 18-ed. The adsorbate 18-ed sticks to an adsorption layer 10 with this newly produced suction force, and is held.

[0026] After that, when the change-over circuit 20 supplies reverse polar DC power supply, makes an adsorption layer 10 newly produce an electrostatic suction force and holds the adsorbate 18-ed. The time amount t from the flow initiation by supply of DC power supply is clocked by the timer section 22. When said change-over conditions are satisfied by the decision section 24, after intercepting a cable run 16 that supply of the DC power supply to an electrode 6-8 should be suspended by the change-over section 26, and it should once consider as non-switch-on, a cable run 16 is switched that it should consider as the switch-on which gives the

charge of positive/negative reverse to an electrode 6-8, respectively.

[0027] thus, the electrostatic supporting structure 2 should once pass non-switch-on for tevery predetermined time -- the polarity of DC power supply -- being reversed -- the electrode 6-8 of a lot -- respectively -- positive/negative -- when supplying DC power supply to the electrode 6-8 of a lot that adsorption maintenance of the adsorbate 18-ed should be carried out over a long time by considering as the switch-on which gives a reverse polar charge, the charge of the adsorbate 18-ed by which adsorption maintenance was carried out can be negated to a fixing disc 12, and electrification can be prevented.

[0028] Moreover, the electrostatic supporting structure 2 makes an electrostatic suction force newly act between each electrode 6-8 and the adsorbate 18-ed by the polar change of the DC power supply for tevery predetermined time, can adsorb the adsorbate 18-ed with this newly produced suction force at an adsorption layer 10, and can be held.

[0029] For this reason, when carrying out adsorption maintenance of the adsorbate 18-ed over a long time, the electrostatic supporting structure 2 can prevent the fall of the suction force by electrification of the adsorbate 18-ed, moreover, with the suction force which newly produced the electrostatic supporting structure 2, over a long time, is stabilized and can hold the adsorbate 18-ed.

[0030] Drawing 4 shows the 2nd example of this invention.

[0031] In the 2nd example, the timer section 22 of the change-over circuit 20 which consists of the timer section 22, the decision section 24, and the change-over section 26 clocks the time amount t from the flow initiation by supply of the DC power supply of a power supply section 14. Said decision section 24 judges whether the change-over conditions of exceeding [the time amount t which the timer section 22 clocks]-predetermined time t1 ** are satisfied, and when change-over conditions are satisfied, it carries out change-over actuation of the change-over section 26.

[0032] Said change-over section 26 switches a cable run 16 that it should consider as the switch-on which reverses the polarity of DC power supply and gives the charge of positive/negative reverse to the electrode 6-8 of a lot, respectively, after intercepting a cable run 16 that change-over actuation is carried out by the decision section 24, and supply of the DC power supply to the electrode 6-8 of a lot should be suspended, and it should once consider as non-switch-on. Subsequently, the change-over section 26 switches a cable run 16 that it should consider as the switch-on which reverses the polarity of DC power supply and gives the charge of positive/negative reverse to the electrode 6-8 of a lot, respectively, after intercepting a cable run 16 that supply of the DC power supply to the electrode 6-8 of a lot should be suspended, and it should once consider as non-switch-on.

[0033] After that, when the change-over circuit 20 supplies DC power supply, makes an adsorption layer 10 newly produce an electrostatic suction force and holds the adsorbate 18-ed. The time amount t from the flow initiation by supply of DC power supply is clocked by the timer section 22. A cable run 16 is switched that it should consider as the switch-on which reverses the polarity of DC power supply and gives the charge of positive/negative reverse after intercepting a cable run 16 that it should once consider as non-switch-on when said change-over conditions are satisfied by the decision section 24. Subsequently After intercepting a cable run 16 that it should once consider as non-switch-on, a cable run 16 is switched that it should consider as the switch-on which reverses the polarity of DC power supply and gives the charge of positive/negative reverse.

[0034] Therefore, after the electrostatic supporting structure 2 once reverses the polarity of DC power supply temporarily through non-switch-on for tevery predetermined time and gives the polar charge of positive/negative reverse to the electrode 6-8 of a lot, respectively By considering as the switch-on which once reverses the polarity of DC power supply further through non-switch-on, and gives the polar charge of positive/negative reverse to the electrode 6-8 of a lot, respectively When supplying DC power supply to the electrode 6-8 of a lot that adsorption maintenance of the adsorbate 18-ed should be carried out over a long time, the charge of the adsorbate 18-ed by which adsorption maintenance was carried out can be negated to a fixing disc 12, and electrification can be prevented.

[0035] Moreover, the electrostatic supporting structure 2 makes an electrostatic suction force newly act between each electrode 6-8 and the adsorbate 18-ed by the polar change of the DC power supply for tevery predetermined time, can adsorb the adsorbate 18-ed with this newly produced suction force at an adsorption layer 10, and can be held.

[0036] Thereby, according to the 2nd example, when carrying out adsorption maintenance of the adsorbate 18-ed over a long time, the electrostatic supporting structure 2 can prevent the fall of the suction force by electrification of the adsorbate 18-ed, moreover, over a long time, is stabilized and can hold the adsorbate 18-ed with the suction force which newly produced the electrostatic supporting structure 2.

[0037] Drawing 5 and drawing 6 show the 3rd example of this invention.

[0038] drawing -- setting -- 102 -- the electrostatic supporting structure and 104 -- for an adsorption layer and 112, as for a power supply section and 116, a fixing disc and 114 are [an insulating substratum and 106-108 / the electrode of a lot, and 110 / a cable run and 118] adsorbate-ed. The electrostatic supporting structure 102 supplies and flows through DC power supply in the electrode 106-108 of the lot of a fixing disc 112 from a power supply section 114, gives forward negative charge, respectively, carries out dielectricity of the adsorption layer 110 of a fixing disc 112, makes an electrostatic suction force act between the charge of each electrode 106-108, and the reverse polar charge produced in the adsorbate 118-ed, and adsorbs and holds the adsorbate 118-ed on the front face of an adsorption layer 110.

[0039] In such the electrostatic supporting structure 102, the change-over circuit 120 is established in the cable run 116 between an electrode 106-108 and a power supply section 114 as a means for switching. The change-over circuit 120 switches the DC power supply which a power supply section 114 supplies that it should consider as the switch-on which once gives the charge of positive/negative reverse to the electrode 106-108 of a lot through non-switch-on, respectively, when supplying DC power supply to the electrode 106-108 of a lot, making the adsorption layer 110 produce an electrostatic suction force and change-over conditions are satisfied.

[0040] In the 3rd example, the change-over circuit 120 which consists of a detecting element 122, the timer section 124, the decision section 126, and the change-over section 128 is formed.

[0041] The detecting element 122 of the change-over circuit 120 detects the current value A of the DC power supply which a power supply section 114 supplies. The timer section 124 clocks the time amount t after the current value A which a detecting element 122 detects falls to less than [predetermined current value A1]. The decision section 126 judges whether the change-over conditions of that the current value A which a detecting element 122 detects fell to less than [predetermined current value A1], and being [the time amount t clocked by the timer section 124 after a current value A falls to less than / predetermined current value A1 / over predetermined time t1] ** are satisfied, and when change-over conditions are satisfied, it carries out change-over actuation of the change-over section 128.

[0042] Change-over actuation is carried out by the decision section 126, and said change-over section 128 suspends supply of the DC power supply to the electrode 106-108 of a lot, and switches a cable run 116 that it should consider as the switch-on which intercepts a cable run 116 that it should once consider as non-switch-on, reverses the polarity of the DC power supply supplied to an electrode 106-108, and gives the charge of positive/negative reverse, respectively.

[0043] Next, an operation of the 3rd example is explained.

[0044] The electrostatic supporting structure 102 carries out dielectricity of the adsorption layer 110 of a fixing disc 112 by supplying DC power supply to the electrode 106-108 of the lot of a fixing disc 112 from a power supply section 114, and giving forward negative charge, respectively. If the electrostatic supporting structure 102 contacts the adsorbate 108-ed to an adsorption layer 110, an electrostatic suction force acts between the charge of each electrode 106-108, and the charge of a different polarity produced in the adsorbate 118-ed, and it will stick to an adsorption layer 110 and will hold the adsorbate 118-ed.

[0045] The current value A of the DC power supply supplied by said power supply section 114

falls to the predetermined current value A1, after starting to a peak price immediately after flow initiation, as shown in drawing 6, and it decreases gradually after that. When the change-over circuit 120 supplies DC power supply and is making the adsorption layer 110 produce an electrostatic suction force, it clocks the time amount t after the current value A of the DC power supply which a power supply section 114 supplies falls to less than [predetermined current value A1], and switches switch-on.

[0046] When the change-over circuit 120 supplies DC power supply to the electrode 106-108 of a lot, makes an adsorption layer 110 produce an electrostatic suction force and holds the adsorbate 118-ed, it detects the current value A of the DC power supply which a power supply section 114 supplies by the detecting element 122.

[0047] The decision section 126 carries out change-over actuation of the change-over section 128, when the change-over conditions of that the current value A of DC power supply fell to less than [predetermined current value A1] and exceeding [the time amount t which the timer section 124 after a current value A falls to less than / predetermined current value A1 / clocks]-predetermined time t1 ** are satisfied. The change-over section 126 switches a cable run 116 that it should consider as the switch-on which gives the charge of positive/negative reverse to the electrode 106-108 of a lot, respectively, after intercepting a cable run 116 that supply of the DC power supply to the electrode 106-108 of a lot should be suspended, and it should once consider as non-switch-on.

[0048] Thereby, the electrostatic supporting structure 102 reverses and flows through the polarity of the DC power supply supplied to an electrode 106-108, and makes an electrostatic suction force newly act between each electrode 106-108 and the adsorbate 118-ed. The adsorbate 118-ed sticks to an adsorption layer 110 with this newly produced suction force, and is held.

[0049] After that, when the change-over circuit 120 supplies reverse polar DC power supply, makes an adsorption layer 110 newly produce an electrostatic suction force and holds the adsorbate 118-ed. The time amount t after a detecting element 122 detects the current value A of DC power supply and a current value A falls to less than [predetermined current value A1] by the timer section 124 is clocked. When said change-over conditions are satisfied by the decision section 126, after intercepting a cable run 116 that supply of the DC power supply to an electrode 106-108 should be suspended by the change-over section 128, and it should once consider as non-switch-on. A cable run 116 is switched that it should consider as the switch-on which gives the charge of positive/negative reverse to an electrode 106-108, respectively.

[0050] The electrostatic supporting structure 102 thus, by considering as the switch-on which will once reverse the polarity of DC power supply through non-switch-on, and will give the polar charge of positive/negative reverse to the electrode 106-108 of a lot, respectively if predetermined time t1 is exceeded after a current value A falls to less than [predetermined current value A1] When supplying DC power supply to the electrode 106-108 of a lot that adsorption maintenance of the adsorbate 118-ed should be carried out over a long time, the charge of the adsorbate 118-ed by which adsorption maintenance was carried out can be negated to a fixing disc 112, and electrification can be prevented.

[0051] Moreover, after a current value A falls to less than [predetermined current value A1], by the polar change of the DC power supply in the case of exceeding predetermined time t1, the electrostatic supporting structure 102 makes an electrostatic suction force newly act between each electrode 106-108 and the adsorbate 118-ed, can adsorb the adsorbate 118-ed with this newly produced suction force at an adsorption layer 110, and can be held.

[0052] For this reason, when carrying out adsorption maintenance of the adsorbate 118-ed over a long time, the electrostatic supporting structure 102 can prevent the fall of the suction force by electrification of the adsorbate 118-ed, moreover, with the suction force which newly produced the electrostatic supporting structure 102, over a long time, is stabilized and can hold the adsorbate 118-ed.

[0053] According to this 3rd example, furthermore, the change-over circuit 120 The time amount t after a detecting element 122 detects the current value A of DC power supply and a current value A falls to less than [predetermined current value A1] by the timer section 124 is clocked.

By switching that it should consider as the switch-on which once reverses the polarity of DC power supply through non-switch-on by the change-over section 128, and gives the polar charge of positive/negative reverse to the electrode 106-108 of a lot, respectively when change-over conditions are satisfied by the decision section 126 Electrification of the adsorbate 118-ed can be prevented certainly.

[0054] Drawing 7 shows the 4th example of this invention.

[0055] In the 4th example, the detecting element 122 of the change-over circuit 120 which consists of a detecting element 122, the timer section 124, the decision section 126, and the change-over section 128 detects the current value A of the DC power supply which a power supply section 114 supplies. The timer section 124 clocks the time amount t after the current value A which a detecting element 122 detects falls to less than [predetermined current value A1]. The decision section 126 judges whether the change-over conditions of that the current value A which a detecting element 122 detects fell to less than [predetermined current value A1], and being [the time amount t which the timer section 124 after a current value A falls to less than / predetermined current value A1 / clocks / over predetermined time t1] ** are satisfied, and when change-over conditions are satisfied, it carries out change-over actuation of the change-over section 128.

[0056] Said change-over section 128 switches a cable run 116 that it should consider as the switch-on which reverses the polarity of DC power supply and gives the charge of positive/negative reverse to the electrode 106-108 of a lot, respectively, after intercepting a cable run 116 that change-over actuation is carried out by the decision section 24, and supply of the DC power supply to the electrode 106-108 of a lot should be suspended, and it should once consider as non-switch-on. Subsequently, the change-over section 126 switches a cable run 116 that it should consider as the switch-on which reverses the polarity of DC power supply and gives the charge of positive/negative reverse to the electrode 106-108 of a lot, respectively, after intercepting a cable run 116 that supply of the DC power supply to the electrode 106-108 of a lot should be suspended, and it should once consider as non-switch-on.

[0057] After that, when the change-over circuit 120 supplies DC power supply, makes an adsorption layer 110 newly produce an electrostatic suction force and holds the adsorbate 118-ed The time amount t after a detecting element 122 detects the current value A of DC power supply and a current value A falls to less than [predetermined current value A1] by the timer section 124 is clocked. A cable run 116 is switched that it should consider as the switch-on which reverses the polarity of DC power supply and gives the charge of positive/negative reverse after intercepting a cable run 116 that it should once consider as non-switch-on when said change-over conditions are satisfied by the decision section 126. Subsequently After intercepting a cable run 116 that it should once consider as non-switch-on, a cable run 116 is switched that it should consider as the switch-on which reverses the polarity of DC power supply and gives the charge of positive/negative reverse.

[0058] Therefore, if predetermined time t1 is exceeded after a current value A falls to less than [predetermined current value A1], after the electrostatic supporting structure 102 will once reverse the polarity of DC power supply temporarily through non-switch-on and will give the polar charge of positive/negative reverse to the electrode 106-108 of a lot, respectively By considering as the switch-on which once reverses the polarity of DC power supply further through non-switch-on, and gives the polar charge of positive/negative reverse to the electrode 106-108 of a lot, respectively When supplying DC power supply to the electrode 106-108 of a lot that adsorption maintenance of the adsorbate 118-ed should be carried out over a long time, the charge of the adsorbate 118-ed by which adsorption maintenance was carried out can be negated to a fixing disc 112, and electrification can be prevented.

[0059] Moreover, after a current value A falls to less than [predetermined current value A1], by the polar change of the DC power supply in the case of exceeding predetermined time t1, the electrostatic supporting structure 102 makes an electrostatic suction force newly act between each electrode 106-108 and the adsorbate 118-ed, can adsorb the adsorbate 118-ed with this newly produced suction force at an adsorption layer 110, and can be held.

[0060] Thereby, according to the 4th example, when carrying out adsorption maintenance of the

adsorbate 118-ed over a long time, the electrostatic supporting structure 102 can prevent the fall of the suction force by electrification of the adsorbate 118-ed, moreover, over a long time, is stabilized and can hold the adsorbate 118-ed with the suction force which newly produced the electrostatic supporting structure 102.

[0061] According to this 4th example, furthermore, the change-over circuit 120 The time amount t after a detecting element 122 detects the current value A of DC power supply and a current value A falls to less than [predetermined current value A1] by the timer section 124 is clocked. By switching that it should consider as the switch-on which once reverses the polarity of DC power supply through non-switch-on by the change-over section 128, and gives the polar charge of positive/negative reverse to the electrode 106-108 of a lot, respectively when change-over conditions are satisfied by the decision section 126 Electrification of the adsorbate 118-ed can be prevented certainly.

[0062] In addition, this invention is not limited to the above-mentioned example. For example, in the above-mentioned example, although the change-over circuit was established in the output side of a between [a power supply section and each electrode (i.e. a power supply section)], a change-over circuit can be established in the input side of a power supply section, and it can also switch by change of an input current. Moreover, as a change-over circuit, the detecting element which detects the electrostatic capacity of a fixing disc is prepared, the decision section which the electrostatic capacity which this detecting element detects fell below to the predetermined value, or judges no is prepared, and when electrostatic capacity falls below to a predetermined value, the change-over section switched that it should consider as the switch-on which once reverses the polarity of DC power supply through non-switch-on, and gives the polar charge of positive/negative reverse to the electrode of a lot, respectively can also prepare.

[0063]

[Effect of the Invention] thus, according to this invention, the electrostatic supporting structure should once pass non-switch-on -- the electrode of a lot -- respectively -- positive/negative -- when supplying DC power supply to the electrode of a lot that adsorption maintenance of the adsorbate-ed should be carried out over a long time by giving a reverse charge, the charge of the adsorbate-ed by which adsorption maintenance was carried out can be negated to a fixing disc, and electrification can be prevented. Moreover, the electrostatic supporting structure makes an electrostatic suction force newly act between each electrode and the adsorbate-ed by the change of DC power supply, can adsorb the adsorbate-ed with this newly produced suction force at an adsorption layer, and can be held.

[0064] For this reason, the electrostatic supporting structure can prevent the fall of the suction force by electrification of the adsorbate-ed, when carrying out adsorption maintenance of the adsorbate-ed over a long time, and moreover, with the newly produced suction force, over a long time, the electrostatic supporting structure is stabilized and can hold the adsorbate-ed.

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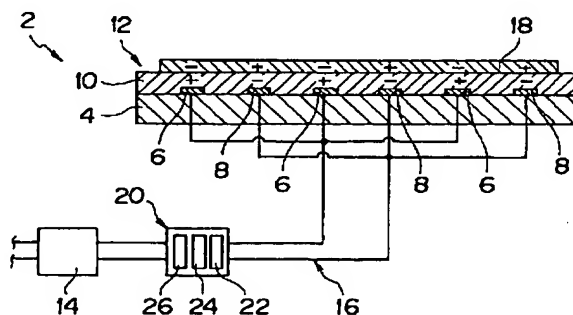
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(54)【発明の名称】 静電保持装置

(57)【要約】

【目的】 この発明の目的は、長時間にわたり被吸着物を吸着する場合の吸引力の低下を防止し得て、被吸着物を長時間にわたり安定して保持し得る静電吸着装置を実現することにある。

【構成】 この目的を達成するために、この発明は、絶縁基層と導通により夫々正負の電荷を付与される一組の電極とこの一組の電極により誘電されて静電的な吸引力により被吸着物を吸着する吸着層とを順次に積層した吸着板を設け、前記一組の電極に直流電源を供給して前記吸着層に静電的な吸引力を生じさせる電源部を設けた静電保持装置において、前記一組の電極に直流電源を供給して前記吸着層に静電的な吸引力を生じさせている際に切換条件が成立する場合には一旦非導通状態を経て前記一組の電極に夫々正負逆の電荷を付与する導通状態とすべく直流電源を切換える切換手段を設けたことを特徴とする。



【特許請求の範囲】

【請求項1】 絶縁基層と導通により夫々正負の電荷を付与される一組の電極とこの一組の電極により誘電されて静電的な吸引力により被吸着物を吸着する吸着層とを順次に積層した吸着板を設け、前記一組の電極に直流電源を供給して前記吸着層に静電的な吸引力を生じさせる電源部を設けた静電保持装置において、前記一組の電極に直流電源を供給して前記吸着層に静電的な吸引力を生じさせている際に切換条件が成立する場合には一旦非導通状態を経て前記一組の電極に夫々正負逆の電荷を付与する導通状態とすべく直流電源を切替える切替手段を設けたことを特徴とする静電保持装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】この発明は静電保持装置に係り、特に長時間にわたり被吸着物を吸着する場合の吸引力の低下を防止し得て、被吸着物を長時間にわたり安定して保持し得る静電保持装置に関する。

【0002】

【従来の技術】静電気のクーロン力を利用して被吸着物を吸着保持する静電保持装置は、絶縁基層と一組の電極と吸着層とを順次に積層した吸着板を設け、前記一組の電極に直流電源を供給して前記吸着層に静電的な吸引力を生じさせる電源部を設けている。静電保持装置は、電源部により吸着板の一組の電極に直流電源を供給し、この導通により前記一組の電極に夫々正負の電荷を付与してし吸着板を誘電し、この吸着板の静電的な吸引力により被吸着物を吸着して保持する。

【0003】このような静電保持装置としては、特公昭47-39392号公報や、特開昭62-153034号公報に開示されるものがある。

【0004】特公昭47-39392号公報に開示の静電保持装置は、ロータリースイッチによって、紙を吸着する際には一時的に逆の極性とした後に吸着時の極性の導通状態なるように切替え、紙を剥脱する際には一時的に逆の極性とした後に非導通状態となるように切替えるものである。

【0005】特開昭62-153034号公報に開示の静電保持装置は、切替スイッチによって、紙等のシートを吸着する際には一時的に交流電圧を印可した後に吸着時の極性の導通状態なるように切替え、シートを剥脱する際には一時的に交流電圧を印可した後に非導通状態となるように切替えるものである。

【0006】

【発明が解決しようとする課題】ところで、従来の静電保持装置には、長時間にわたり被吸着物を吸着して保持するものがある。このような場合に、静電保持装置は、一組の電極に直流電源を継続して供給している。

【0007】ところが、静電保持装置は、長時間にわたり被吸着物を吸着保持すべく一組の電極に直流電源を供

給すると、吸着板に吸着保持された被吸着物が帯電してしまい、吸着板による静電的な吸引力を低下させる問題がある。

【0008】このため、従来の静電保持装置は、長時間にわたり被吸着物を吸着する場合に、吸引力が低下して被吸着物を保持し得なくなり、被吸着物を長時間にわたり安定して保持し得ない不都合があった。

【0009】

【課題を解決するための手段】そこで、このような不都合を解消すべく、この発明は、絶縁基層と導通により夫々正負の電荷を付与される一組の電極とこの一組の電極により誘電されて静電的な吸引力により被吸着物を吸着する吸着層とを順次に積層した吸着板を設け、前記一組の電極に直流電源を供給して前記吸着層に静電的な吸引力を生じさせる電源部を設けた静電保持装置において、前記一組の電極に直流電源を供給して前記吸着層に静電的な吸引力を生じさせている際に切換条件が成立する場合には一旦非導通状態を経て前記一組の電極に夫々正負逆の電荷を付与する導通状態とすべく直流電源を切替える切替手段を設けたことを特徴とする。

【0010】

【作用】この発明の構成によれば、切替手段は、吸着板の一組の電極に直流電源を供給して吸着層に静電的な吸引力を生じさせている際に、切換条件が成立する場合には、一旦非導通状態を経て前記一組の電極に夫々正負逆の電荷を付与する導通状態とすべく直流電源を切替える。

【0011】これにより、静電保持装置は、一旦非導通状態を経て前記一組の電極に夫々正負逆の電荷を付与することにより、長時間にわたり被吸着物を吸着保持すべく一組の電極に直流電源を供給する場合に、吸着板に吸着保持された被吸着物の電荷を打ち消して帯電を防止することができる。また、静電保持装置は、直流電源の切替えにより各電極と被吸着物との間に新たに静電的な吸引力を作用させ、この新たに生じた吸引力により被吸着物を吸着層に吸着して保持することができる。

【0012】

【実施例】以下図面に基づいてこの発明の実施例を説明する。

【0013】図1～図3は、この発明を第1実施例を示すものである。図1・図2において、2は静電保持装置である。静電保持装置2は、図2に示す如く、絶縁基層4と、導通により夫々正負の電荷を付与される一組の電極6・8と、この一組の電極6・8により誘電されて静電的な吸引力により被吸着物18を吸着する吸着層10と、を順次に積層した吸着板12を設けている。また、静電保持装置2は、前記一組の電極6・8に直流電源を供給して前記吸着層10に静電的な吸引力を生じさせる電源部14を設けている。電源部14は、電路16により一組の電極6・8に接続されている。

【0014】前記静電保持装置2は、電源部14から吸着板12の一組の電極6・8に直流電源を供給して導通し、夫々正負の電荷を付与すると、吸着板12の吸着層10が誘電される。静電保持装置2は、図1に示す如く、被吸着物18を吸着層10に接触させると、この被吸着物18の各電極6・8と対向する部位に、夫々静電誘導により各電極6・8の電荷の極性と異なる極性の電荷が生じる。

【0015】これにより、静電保持装置2は、各電極6・8の電荷と被吸着物18に生じた電荷との間に静電的な吸引力が作用し、被吸着物18を吸着層10の表面に吸着して保持する。

【0016】このような静電保持装置2において、電極6・8と電源部14との間の電路16には、切換手段として切換回路20を設けている。切換回路20は、一組の電極6・8に直流電源を供給して吸着層10に静電的な吸引力を生じさせている際に、切換条件が成立する場合には、一旦非導通状態を経て一組の電極6・8に夫々正負逆の電荷を付与する導通状態とすべく電源部14の供給する直流電源を切換える。

【0017】この第1実施例においては、タイマ部22と判断部24と切換部26とから構成される切換回路20を設けている。

【0018】切換回路20のタイマ部22は、図3に示す如く、電源部14の直流電源の供給による導通開始からの時間 t を計時する。前記判断部24は、タイマ部22の計時する時間 t が所定時間 t_1 を越えたこと、の切換条件が成立する否かを判断し、切換条件が成立する場合に切換部26を切換動作させる。

【0019】前記切換部26は、判断部24により切換動作され、一組の電極6・8への直流電源の供給を停止して一旦非導通状態とすべく電路16を遮断し、直流電源の極性を反転して一組の電極6・8に夫々正負逆の電荷を付与する導通状態とすべく電路16を切換える。

【0020】次に第1実施例の作用を説明する。

【0021】静電保持装置2は、電源部14から吸着板12の一組の電極6・8に直流電源を供給して導通し、夫々正負の電荷を付与することにより、吸着板12の吸着層10を誘電する。静電保持装置2は、誘電された吸着層10に被吸着物18を接触させると、各電極6・8の電荷と被吸着物18に生じた異なる極性の電荷との間に静電的な吸引力が作用し、被吸着物18を吸着層10に吸着して保持する。

【0022】前記電源部14により供給される直流電源の電流値は、図3に示す如く、導通開始直後に最高値まで立ち上がった後に所定値まで下がり、その後漸次減少する。切換回路20は、直流電源を供給して吸着層10に静電的な吸引力を生じさせている際に、導通開始からの時間 t を計時して導通状態を切換える。

【0023】切換回路20は、一組の電極6・8に直流

電源を供給して吸着層10に静電的な吸引力を生じさせて被吸着物18を保持している際に、タイマ部22により直流電源の供給による導通開始からの時間 t を計時する。

【0024】判断部24は、タイマ部22の計時する時間 t が所定時間 t_1 を越えたこと、の切換条件が成立する場合に、切換部26を切換動作させる。切換部26は、タイマ部22の計時する時間 t が所定時間 t_1 を越えると、一組の電極6・8への直流電源の供給を停止して一旦非導通状態とすべく電路16を遮断してから、一組の電極6・8に夫々正負逆の電荷を付与する導通状態とすべく電路16を切換える。

【0025】これにより、静電保持装置2は、電極6・8に供給される直流電源の極性を反転して導通し、各電極6・8の電荷と被吸着物18の電荷との間に新たに静電的な吸引力を作用させる。被吸着物18は、この新に生じた吸引力により吸着層10に吸着して保持される。

【0026】その後、切換回路20は、逆の極性の直流電源を供給して吸着層10に新たに静電的な吸引力を生じさせて被吸着物18を保持している際に、タイマ部22により直流電源の供給による導通開始からの時間 t を計時し、判断部24により前記切換条件が成立する場合に、切換部26により電極6・8への直流電源の供給を停止して一旦非導通状態とすべく電路16を遮断してから、電極6・8に夫々正負逆の電荷を付与する導通状態とすべく電路16を切換える。

【0027】このように、静電保持装置2は、所定時間 t_1 毎に一旦非導通状態を経て直流電源の極性を反転して一組の電極6・8に夫々正負逆の極性の電荷を付与する導通状態とすることにより、長時間にわたり被吸着物18を吸着保持すべく一組の電極6・8に直流電源を供給する場合に、吸着板12に吸着保持された被吸着物18の電荷を打ち消して帯電を防止することができる。

【0028】また、静電保持装置2は、所定時間 t_1 毎の直流電源の極性の切換えにより各電極6・8と被吸着物18との間に新たに静電的な吸引力を作用させ、この新たに生じた吸引力により被吸着物18を吸着層10に吸着して保持することができる。

【0029】このため、静電保持装置2は、長時間にわたり被吸着物18を吸着保持する場合に、被吸着物18の帯電による吸引力の低下を防止することができ、しかも、静電保持装置2は、新たに生じた吸引力により被吸着物18を長時間にわたり安定して保持することができる。

【0030】図4は、この発明の第2実施例を示すものである。

【0031】第2実施例において、タイマ部22と判断部24と切換部26とから構成される切換回路20のタイマ部22は、電源部14の直流電源の供給による導通開始からの時間 t を計時する。前記判断部24は、タイ

マ部22の計時する時間 t が所定時間 t_1 を越えたこと、の切換条件が成立するか否かを判断し、切換条件が成立する場合に切換部26を切換動作させる。

【0032】前記切換部26は、判断部24により切換動作され、一組の電極6・8への直流電源の供給を停止して一旦非導通状態とすべく電路16を遮断してから、直流電源の極性を反転して一組の電極6・8に夫々正負逆の電荷を付与する導通状態とすべく電路16を切換える。次いで、切換部26は、一組の電極6・8への直流電源の供給を停止して一旦非導通状態とすべく電路16を遮断してから、直流電源の極性を反転して一組の電極6・8に夫々正負逆の電荷を付与する導通状態とすべく電路16を切換える。

【0033】その後、切換回路20は、直流電源を供給して吸着層10に新たに静電的な吸引力を生じさせて被吸着物18を保持している際に、タイマ部22により直流電源の供給による導通開始からの時間 t を計時し、判断部24により前記切換条件が成立する場合に、一旦非導通状態とすべく電路16を遮断してから直流電源の極性を反転して正負逆の電荷を付与する導通状態とすべく電路16を切換え、次いで、一旦非導通状態とすべく電路16を遮断してから直流電源の極性を反転して正負逆の電荷を付与する導通状態とすべく電路16を切換える。

【0034】したがって、静電保持装置2は、所定時間 t_1 毎に一旦非導通状態を経て直流電源の極性を一時的に反転して一組の電極6・8に夫々正負逆の極性の電荷を付与した後に、一旦非導通状態を経て直流電源の極性をさらに反転して一組の電極6・8に夫々正負逆の極性の電荷を付与する導通状態とすることにより、長時間にわたり被吸着物18を吸着保持すべく一組の電極6・8に直流電源を供給する場合に、吸着板12に吸着保持された被吸着物18の電荷を打ち消して帯電を防止することができる。

【0035】また、静電保持装置2は、所定時間 t_1 毎の直流電源の極性の切換えにより各電極6・8と被吸着物18との間に新たに静電的な吸引力を作用させ、この新たに生じた吸引力により被吸着物18を吸着層10に吸着して保持することができる。

【0036】これにより、第2実施例によれば、静電保持装置2は、長時間にわたり被吸着物18を吸着保持する場合に、被吸着物18の帯電による吸引力の低下を防止することができ、しかも、静電保持装置2は、新たに生じた吸引力により被吸着物18を長時間にわたり安定して保持することができる。

【0037】図5・図6は、この発明の第3実施例を示すものである。

【0038】図において、102は静電保持装置、104は絶縁基層、106・108は一組の電極、110は吸着層、112は吸着板、114は電源部、116は電

路、118は被吸着物である。静電保持装置102は、電源部114から吸着板112の一組の電極106・108に直流電源を供給して導通し、夫々正負の電荷を付与して吸着板112の吸着層110を誘電し、各電極106・108の電荷と被吸着物118に生じた逆の極性の電荷との間に静電的な吸引力を作用させ、被吸着物118を吸着層110の表面に吸着して保持する。

【0039】このような静電保持装置102において、電極106・108と電源部114との間の電路116には、切換手段として切換回路120を設けている。切換回路120は、一組の電極106・108に直流電源を供給して吸着層110に静電的な吸引力を生じさせている際に、切換条件が成立する場合に、一旦非導通状態を経て一組の電極106・108に夫々正負逆の電荷を付与する導通状態とすべく電源部114の供給する直流電源を切換える。

【0040】第3実施例においては、検出部122とタイマ部124と判断部126と切換部128とから構成される切換回路120を設けている。

【0041】切換回路120の検出部122は、電源部114の供給する直流電源の電流値 A を検出する。タイマ部124は、検出部122の検出する電流値 A が所定電流値 A_1 未満に低下してからの時間 t を計時する。判断部126は、検出部122の検出する電流値 A が所定電流値 A_1 未満に低下したと、電流値 A が所定電流値 A_1 未満に低下してからのタイマ部124により計時される時間 t が所定時間 t_1 を越えていること、の切換条件が成立するか否かを判断し、切換条件が成立する場合に切換部128を切換動作させる。

【0042】前記切換部128は、判断部126により切換動作され、一組の電極106・108への直流電源の供給を停止して一旦非導通状態とすべく電路116を遮断し、電極106・108に供給される直流電源の極性を反転して夫々正負逆の電荷を付与する導通状態とすべく電路116を切換える。

【0043】次に第3実施例の作用を説明する。

【0044】静電保持装置102は、電源部114から吸着板112の一組の電極106・108に直流電源を供給し、夫々正負の電荷を付与することにより、吸着板112の吸着層110を誘電する。静電保持装置102は、被吸着物108を吸着層110に接触させると、各電極106・108の電荷と被吸着物118に生じた異なる極性の電荷との間に静電的な吸引力が作用し、被吸着物118を吸着層110に吸着して保持する。

【0045】前記電源部114により供給される直流電源の電流値 A は、図6に示す如く、導通開始直後に最高値まで立ち上がった後に所定電流値 A_1 まで下がり、その後漸次減少する。切換回路120は、直流電源を供給して吸着層110に静電的な吸引力を生じさせている際に、電源部114の供給する直流電源の電流値 A が所

定電流値A1未満に低下してからの時間tを計時して導通状態を切換える。

【0046】切換回路120は、一組の電極106・108に直流電源を供給して吸着層110に静電的な吸引力を生じさせて被吸着物118を保持している際に、検出部122により電源部114の供給する直流電源の電流値Aを検出する。

【0047】判断部126は、直流電源の電流値Aが所定電流値A1未満に低下したこと、電流値Aが所定電流値A1未満に低下してからのタイマ部124の計時する時間tが所定時間t1を越えたこと、の切換条件が成立する場合に、切換部128を切換動作させる。切換部126は、一組の電極106・108への直流電源の供給を停止して一旦非導通状態とすべく電路116を遮断してから、一組の電極106・108に夫々正負逆の電荷を付与する導通状態とすべく電路116を切換える。

【0048】これにより、静電保持装置102は、電極106・108に供給される直流電源の極性を反転して導通し、各電極106・108と被吸着物118との間に新たに静電的な吸引力を作用させる。被吸着物118は、この新たに生じた吸引力により吸着層110に吸着して保持される。

【0049】その後、切換回路120は、逆の極性の直流電源を供給して吸着層110に新たに静電的な吸引力を生じさせて被吸着物118を保持している際に、検出部122により直流電源の電流値Aを検出し、タイマ部124により電流値Aが所定電流値A1未満に低下してからの時間tを計時し、判断部126により前記切換条件が成立する場合に、切換部128により電極106・108への直流電源の供給を停止して一旦非導通状態とすべく電路116を遮断してから、電極106・108に夫々正負逆の電荷を付与する導通状態とすべく電路116を切換える。

【0050】このように、静電保持装置102は、電流値Aが所定電流値A1未満に低下してから所定時間t1を越えると一旦非導通状態を経て直流電源の極性を反転して一組の電極106・108に夫々正負逆の極性の電荷を付与する導通状態とすることにより、長時間にわたり被吸着物118を吸着保持すべく一組の電極106・108に直流電源を供給する場合に、吸着板112に吸着保持された被吸着物118の電荷を打ち消して帯電を防止することができる。

【0051】また、静電保持装置102は、電流値Aが所定電流値A1未満に低下してから所定時間t1を越える場合の直流電源の極性の切換えにより、各電極106・108と被吸着物118との間に新たに静電的な吸引力を作用させ、この新たに生じた吸引力により被吸着物118を吸着層110に吸着して保持することができる。

【0052】このため、静電保持装置102は、長時間

にわたり被吸着物118を吸着保持する場合に、被吸着物118の帯電による吸引力の低下を防止することができ、しかも、静電保持装置102は、新たに生じた吸引力により被吸着物118を長時間にわたり安定して保持することができる。

【0053】さらに、この第3実施例によれば、切換回路120は、検出部122により直流電源の電流値Aを検出し、タイマ部124により電流値Aが所定電流値A1未満に低下してからの時間tを計時し、判断部126により切換条件が成立する場合に、切換部128により一旦非導通状態を経て直流電源の極性を反転して一組の電極106・108に夫々正負逆の極性の電荷を付与する導通状態とすべく切換えることにより、確実に被吸着物118の帯電を防止することができる。

【0054】図7は、この発明の第4実施例を示すものである。

【0055】第4実施例において、検出部122とタイマ部124と判断部126と切換部128とから構成される切換回路120の検出部122は、電源部114の供給する直流電源の電流値Aを検出する。タイマ部124は、検出部122の検出する電流値Aが所定電流値A1未満に低下してからの時間tを計時する。判断部126は、検出部122の検出する電流値Aが所定電流値A1未満に低下したこと、電流値Aが所定電流値A1未満に低下してからのタイマ部124の計時する時間tが所定時間t1を越えていること、の切換条件が成立するかどうかを判断し、切換条件が成立する場合に切換部128を切換動作させる。

【0056】前記切換部128は、判断部24により切換動作され、一組の電極106・108への直流電源の供給を停止して一旦非導通状態とすべく電路116を遮断してから、直流電源の極性を反転して一組の電極106・108に夫々正負逆の電荷を付与する導通状態とすべく電路116を切換える。次いで、切換部126は、一組の電極106・108への直流電源の供給を停止して一旦非導通状態とすべく電路116を遮断してから、直流電源の極性を反転して一組の電極106・108に夫々正負逆の電荷を付与する導通状態とすべく電路116を切換える。

【0057】その後、切換回路120は、直流電源を供給して吸着層110に新たに静電的な吸引力を生じさせて被吸着物118を保持している際に、検出部122により直流電源の電流値Aを検出し、タイマ部124により電流値Aが所定電流値A1未満に低下してからの時間tを計時し、判断部126により前記切換条件が成立する場合に、一旦非導通状態とすべく電路116を遮断してから直流電源の極性を反転して正負逆の電荷を付与する導通状態とすべく電路116を切換え、次いで、一旦非導通状態とすべく電路116を遮断してから直流電源の極性を反転して正負逆の電荷を付与する導通状態と

すべく電路116を切換える。

【0058】したがって、静電保持装置102は、電流値Aが所定電流値A1未満に低下してから所定時間t1を越えると一旦非導通状態を経て直流電源の極性を一時的に反転して一組の電極106・108に夫々正負逆の極性の電荷を付与した後に、一旦非導通状態を経て直流電源の極性をさらに反転して一組の電極106・108に夫々正負逆の極性の電荷を付与する導通状態とすることにより、長時間にわたり被吸着物118を吸着保持すべく一組の電極106・108に直流電源を供給する場合に、吸着板112に吸着保持された被吸着物118の電荷を打ち消して帯電を防止することができる。

【0059】また、静電保持装置102は、電流値Aが所定電流値A1未満に低下してから所定時間t1を越える場合の直流電源の極性の切換えにより、各電極106・108と被吸着物118との間に新たに静電的な吸引力を作用させ、この新たに生じた吸引力により被吸着物118を吸着層110に吸着して保持することができる。

【0060】これにより、第4実施例によれば、静電保持装置102は、長時間にわたり被吸着物118を吸着保持する場合に、被吸着物118の帯電による吸引力の低下を防止することができ、しかも、静電保持装置102は、新たに生じた吸引力により被吸着物118を長時間にわたり安定して保持することができる。

【0061】さらに、この第4実施例によれば、切換回路120は、検出部122により直流電源の電流値Aを検出し、タイマ部124により電流値Aが所定電流値A1未満に低下してから時間tを計時し、判断部126により切換条件が成立する場合に、切換部128により一旦非導通状態を経て直流電源の極性を反転して一組の電極106・108に夫々正負逆の極性の電荷を付与する導通状態とすべく切換えることにより、確実に被吸着物118の帯電を防止することができる。

【0062】なお、この発明は、上述実施例に限定されるものではない。例えば、上述実施例においては、切換回路を電源部と各電極との間、つまり電源部の出力側に設けたが、電源部の入力側に切換回路を設け、入力電流の変化により切換えることもできる。また、切換回路としては、吸着板の静電容量を検出する検出部を設け、この検出部の検出する静電容量が所定値以下に低下したか否を判断する判断部を設け、静電容量が所定値以下に低下した場合に一旦非導通状態を経て直流電源の極性を反転して一組の電極に夫々正負逆の極性の電荷を付与する導通状態とすべく切換える切換部を設けることもでき

る。

【0063】

【発明の効果】このように、この発明によれば、静電保持装置は、一旦非導通状態を経て一組の電極に夫々正負逆の電荷を付与することにより、長時間にわたり被吸着物を吸着保持すべく一組の電極に直流電源を供給する場合に、吸着板に吸着保持された被吸着物の電荷を打ち消して帯電を防止することができる。また、静電保持装置は、直流電源の切換えにより各電極と被吸着物との間に新たに静電的な吸引力を作用させ、この新たに生じた吸引力により被吸着物を吸着層に吸着して保持することができる。

【0064】このため、静電保持装置は、長時間にわたり被吸着物を吸着保持する場合に、被吸着物の帯電による吸引力の低下を防止することができ、しかも、静電保持装置は、新たに生じた吸引力により被吸着物を長時間にわたり安定して保持することができる。

【図面の簡単な説明】

【図1】この発明の第1実施例を示す静電保持装置の断面図である。

【図2】静電保持装置の分解斜視図である。

【図3】第1実施例による電流値のタイミングチャートである。

【図4】第2実施例による電流値のタイミングチャートである。

【図5】この発明の第3実施例を示す静電保持装置の断面図である。

【図6】第3実施例による電流値のタイミングチャートである。

【図7】第4実施例による電流値のタイミングチャートである。

【符号の説明】

2 静電保持装置

4 絶縁基層

6 電極

8 電極

10 吸着層

12 吸着板

14 電源部

16 電路

18 被吸着物

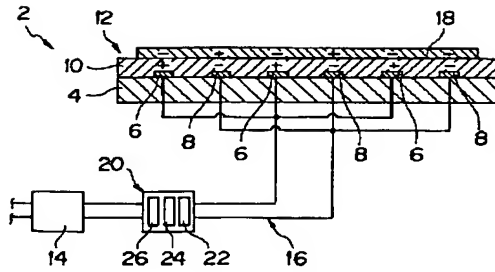
20 切換回路

22 タイマ部

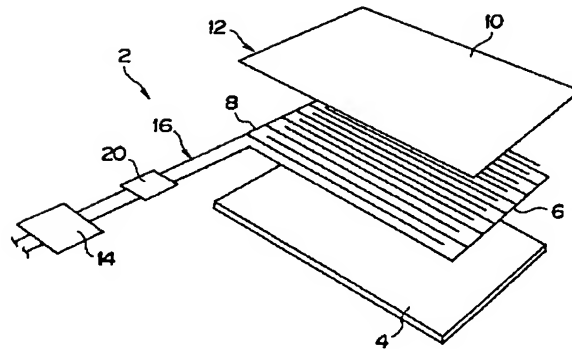
24 判断部

26 切換部

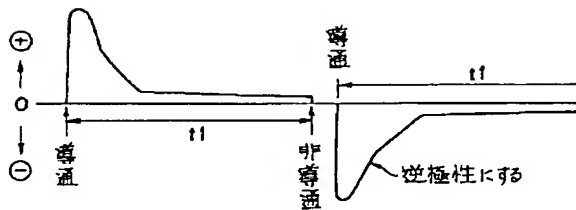
【図1】



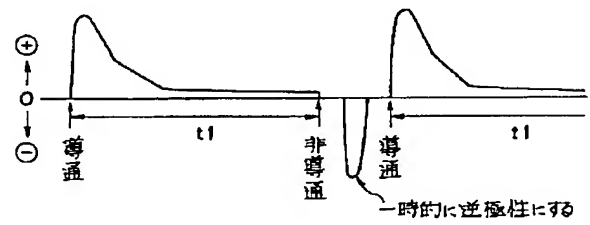
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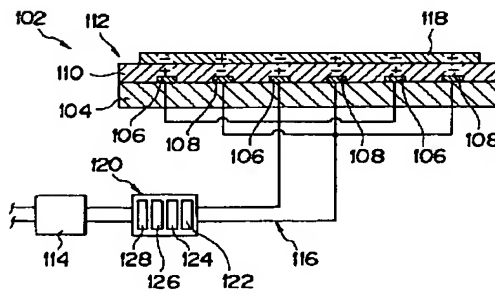
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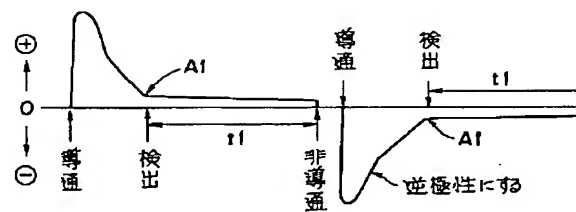
【図4】



【図5】



【図6】



【図7】

